

What is Claimed Is:

1. A control system having a central digital controller having a digital controller frame rate and a command signal, a  
5 motor, and a motor controller in communication with the central digital controller and the motor, the motor controller having a motor controller frame rate higher than the digital controller frame rate, the control system comprising:

a signal conditioner adapted to condition the command  
10 signal so as to generate a modified command signal at the motor controller frame rate.

2. The control system of claim 1, wherein the modified command signal is an interpolation of the command signal over a plurality of frames.

15 3. The control system of claim 1, wherein the signal conditioner comprises a computer readable medium having computer readable program code embodied thereon.

4. The control system of claim 3, wherein the computer readable code, when executed, calculates a moving average at  
20 the frame rate of the motor controller.

5. The control system of claim 3, wherein the signal conditioner comprises:

a first order hold; and

a filter in communication with the first order hold.

25 6. The control system of claim 5, wherein the filter comprises a first order filter.

7. The control system of claim 5, wherein the filter has a breakpoint and wherein the breakpoint is selected to negate any high frequency gain increase introduced by the  
30 first order hold.

8. The control system of claim 5, wherein the first order hold comprises a linear extrapolation of the command signal of the digital controller over a plurality of frames.

9. The control system of claim 8, wherein the linear  
5 extrapolation comprises the use of the last two command signals of the digital controller and has a starting point being the most recent command signal of the digital controller.

10. The control system of claim 3, wherein the computer  
10 readable medium is stored on the motor controller.

11. An apparatus comprising:

a computer readable medium having computer readable program code embodied thereon, the computer readable program code, when executed, implementing on a computer a method of  
15 conditioning a command signal generated by a central digital controller having a digital controller frame rate prior to its application to a motor controller having a motor controller frame rate higher than the digital controller frame rate, the method including modifying the command signal to produce a  
20 modified command signal at the motor controller frame rate.

12. The apparatus of claim 11, wherein the method of conditioning comprises interpolating the command signal over a plurality of frames.

13. The apparatus of claim 11, wherein the method of  
25 conditioning comprises calculating a moving average at the frame rate of the motor controller.

14. The apparatus of claim 11, wherein the method of conditioning comprises:

linearly extrapolating the command signal from the  
30 digital controller over a plurality of frames; and  
filtering the linearly extrapolated command signal.

15. A control system, comprising:

a central digital controller having a command signal and a digital controller frame rate;

a motor controller having a motor controller frame rate higher than the digital controller frame rate; and

5 a signal conditioner adapted to condition the command signal to produce a modified command signal at the motor controller frame rate.

16. The control system of claim 16, wherein the modified command signal is an interpolation of the command signal over  
10 a plurality of frames.

17. The control system of claim 15, wherein the signal conditioner comprises a computer readable medium having computer readable program code embodied thereon.

18. The control system of claim 15, wherein the computer  
15 readable code, when executed, calculates a moving average at the frame rate of the motor controller.

19. The control system of claim 17, wherein the computer readable medium is stored on the motor controller.

20. The control system of claim 15, wherein the signal  
20 conditioner comprises:

a first order hold; and

a filter in communication with the first order hold.

21. The control system of claim 20, wherein the filter comprises a first order filter.

25 22. The control system of claim 20, wherein the first order hold comprises a linear extrapolation of the command signal over a plurality of frames.

23. The control system of claim 22, wherein the linear extrapolation comprises the use of the last two command  
30 signals of the digital controller and has a starting point being the most recent command signal of the digital controller.

24. The control system of claim 20, wherein the filter has a breakpoint and wherein the breakpoint is selected to negate any high frequency gain increase introduced by the linear extrapolation.

5 25. A method of conditioning a command signal generated by a central digital controller having a digital controller frame rate prior to its application to a motor controller having a motor controller frame rate higher than the digital controller frame rate, the method comprising:

10 conditioning the command signal to produce a modified command signal at the motor controller frame rate.

26. The method of claim 25, wherein the step of conditioning comprises interpolating the command signal over a plurality of frames.

15 27. The method of claim 25, wherein the step of conditioning comprises calculating a moving average at the frame rate of the motor controller.

28. The method of claim 25, wherein the step of conditioning comprises:

20 linearly extrapolating the command signal of the digital controller over a plurality of frames; and

filtering the linearly extrapolated command signal.

25 29. The method of claim 28, wherein the step of filtering comprises selecting a breakpoint to negate any high frequency gain increase introduced by the step of linear extrapolation.